A Method of Packaging Foodstuffs and Container Packed by said Method

The present invention relates to a method of packaging foodstuffs and particularly, but not exclusively, to a method of packaging cereal based foodstuffs within flexible-walled containers.

Modified Atmosphere Packaging (MAP) of food products in a variety of pack formats and materials is a longstanding technique used to reduce the atmospheric air, and in particular, oxygen content within a sealed pack. By reducing the oxygen content of a sealed pack, the shelf life of a product can be significantly increased by delaying the onset of oxidative rancidity, particularly in products containing oils.

The availability of gusseted plastics laminate and foil pouches with appropriate barrier properties has enabled the development of Pre-Cooked Ambient (PCA) products. Suitable pouches can (i) withstand

conventional full sterilisation retort processes; (ii) retain very low oxygen and moisture permeability after the retort process; and (iii) in the case of plastics laminate pouches, allow foodstuffs to be reheated within their packaging in a microwave oven. Many foodstuffs such as rice, noodles, pasta, sauces and pet food containing small quantities of oil currently use MAP and consequently benefit from ambient shelf lives of 12-18 months or more.

The MAP process involves filling the pouches with a foodstuff and flushing the pouches with inert gases (such as nitrogen and carbon dioxide) to reduce their oxygen content. The inert gas or gas mixture inhibits proliferation of some micro-organisms (moulds and bacteria) with no significant chemical alteration of the product. The pouches are then mechanically squeezed to remove substantially all of the gas mixture and then sealed to achieve a residual oxygen content of typically below 2% and ideally below 1%. After sealing, the pouch is subjected to the full retort sterilisation process.

In the packaging of rice, noodles, pasta and related recipe products (an example of which is egg fried rice containing discrete pieces of scrambled egg and peas), the purging of gases from within a pouch during the MAP process results in the compression and agglomeration of the foodstuff. Using rice as an example, agglomeration of the separate grains means that the product suffers in a presentational

sense. For example, rice grains often become broken and therefore unappealing to the consumer.

According to the present invention there is provided a method of filling a flexible-walled container comprising the steps of:

(i) purging substantially all oxygen from the interior of the container by introducing an inert gas;

(ii) introducing a foodstuff into the container; and

(iii) sealing the container.

Preferably, the step of introducing a foodstuff into the container is preceded by deploying the container from a folded to an unfolded configuration.

Preferably, the step of deploying the container from a folded to an unfolded configuration is achieved by means of gas inflation.

Preferably, if the introduced foodstuff is substantially entirely solid in state, the step of purging substantially all oxygen from the interior of the container is initiated before the step of introducing the solid foodstuff into the container.

Alternatively, if the introduced foodstuff is substantially entirely solid in state, the steps of purging substantially all oxygen from the interior of the container and introducing the solid foodstuff into the container are performed concurrently.

Preferably, if the introduced foodstuff is substantially entirely liquid in state, the step of purging substantially all oxygen from the interior of the container is initiated after the step of introducing the liquid foodstuff into the container.

Preferably, if the step of introducing a foodstuff into the container involves the introduction of a substantially solid foodstuff followed by the introduction of a substantially liquid foodstuff, the step of purging substantially all oxygen from the interior of the container is ceased after the step of introducing the substantially solid foodstuff into the container.

Preferably, the container is inflated by an inert gas after introduction of the substantially solid foodstuff.

Alternatively, the container is inflated by an inert gas after introduction of the substantially liquid foodstuff.

Preferably, the inert gas is introduced into the container by gas introduction means whilst the flexible wall of the open end of the container is engaged tightly against the gas introduction means.

Preferably, the gas introduction means is a nozzle with a substantially flat opening.

Preferably, the container is inflated to a desired volume.

Alternatively, the container is over-inflated beyond a desired volume.

Preferably, a selected volume of the inert gas is subsequently removed from within the container.

Preferably, the selected volume is removed by mechanical squeezing of the flexible wall of the container.

Preferably, the step of sealing the container is performed whilst the container is at least partially inflated to thereby retain a selected volume of inert gas therein.

Preferably, the container is sealed by means of heat sealing.

Preferably, the volume of inert gas remaining within the container is selected to reduce agglomeration of discrete pieces of foodstuff.

Preferably, the foodstuff is cereal based.

Preferably, the cereal is selected from the group consisting of rice, couscous, wild rice, barley, wheat, oats, rye, millet and maize.

Preferably, the flexible-walled container is a plastics pouch.

Preferably, the inert gas is selected from the group consisting of nitrogen, carbon dioxide, helium, argon, neon and xenon.

Preferably, oxygen gas forms less than 2% of the volume of gas within the container.

Most preferably, oxygen gas forms less than 1% of the volume of gas within the container.

According to a second aspect of the present invention there is provided a flexible-walled container filled by the method of any of claims 1 to 22.

Embodiments of the present invention will now be described, by way of example only, with reference to the following drawings in which:

Fig. 1 is a flow diagram showing the various steps in the packaging method of the present invention; and

Fig. 2 is a table showing comparative characteristics of conventional pouches filled using (i) a conventional filling method; and (ii) the filling method of the present invention.

Fig. 1 outlines the various production line stages involved in implementing the method of filling pouches with a foodstuff.

Step 1: The first stage involves picking up and holding a gusseted pouch at its top corners in a conventional manner. Throughout the description, the terms 'pouch' and 'container' are interchangeable. At this stage, the gusset at the base of the pouch is in a folded state such that the whole pouch is in a substantially flat configuration.

Step 2: The second stage involves mechanically separating the walls of the unsealed end of the pouch by introducing a substantially flat nozzle between the walls of its open end. Nitrogen gas is then introduced between the walls to increase the pressure within the pouch and thus deploy the pouch from a substantially flat, folded configuration to an open unfolded configuration.

Step 3: In the case of solid foodstuffs (or a mixture of solids and liquids), these are introduced into the opened pouch whilst the flow of nitrogen gas is maintained. This step ensures that oxygen is flushed from the pouch before being trapped by the foodstuff.

Step 4: If the foodstuff is entirely liquid (that is, not wholly or partially solid) then no gas is introduced concurrently with the foodstuff.

Step 5: Once the foodstuff (whether solid or liquid or both) is introduced into the pouch, a flat nozzle is inserted into its unsealed end. The walls of the unsealed end are pulled tight against the nozzle, which then over-inflates the pouch with nitrogen gas. Once the pouch is inflated, the flat nozzle is removed from the pouch. It is to be understood that the by over-inflate, it is meant that the pouch is inflated to a volume which is greater than the desired volume.

Step 6: The pouch is squeezed in a controlled manner thus removing a selected volume of nitrogen gas and reducing the overall volume of the pouch from its over-inflated level to a desired volume.

Alternatively, step 6 can be omitted such that the nitrogen gas in step 5 is introduced into the pouch in a controlled manner to inflate it to the desired volume, thus obviating the need for the subsequent squeezing step. Once the pouch reaches the desired volume, the unsealed end is heat sealed. The desired volume will vary depending upon the amount and type of foodstuff being packaged.

Step 7: The pouch then undergoes the full retort sterilisation process wherein pouches are transferred into a conventional overpressure retort and subjected to a thermal process (either static or rotational) designed to achieve commercial sterility appropriate to the nature of the contents (e.g. 6

minutes at 121°C for rice products). Retort temperatures must not exceed those specified by pouch manufacturers (normally 130°C).

Neither, either or both of steps 2 and 3 may be employed in combination with step 5 to achieve the required level of oxygen in the sealed pouch which will be dependent on the nature of its contents. Step 6 controls the final volume of the pouch.

Depending upon the nature of the pouch contents, either or both of steps 3 and 4 are employed.

The aforementioned steps of the filling method introduce the following important benefits and improvements. In view of the fact that the pouch is sealed whilst retaining a selected volume of nitrogen gas, the consumer's perception is that the partially inflated pouch looks less rigid, less processed and has an overall enhanced on-shelf appeal.

Moreover, in the conventional packaging process, pouches are squeezed to remove substantially all gas to reduce the volume of the pouches to that of their contents (i.e. vacuum packed). Accordingly, when emptying conventionally packaged pouches the contents are often lumpy and unappealing to the consumer. The consumer is compelled to squeeze the pouch during or subsequent to emptying its contents in order to break up and separate the agglomerated foodstuff. Indeed some packs now contain

instructions to squeeze or break-up their contents before heating.

The partial inflation of the pouch achieved by the method of the present invention reduces agglomeration of its contents and promotes conditions wherein the foodstuff retains its original and familiar characteristics. For example, in the case of rice, the grains remain light, fluffy and separated. This is not only a consumer preference but it also results in easier pouring of the contents of the pouch.

Fig. 2 demonstrates the increased volume of pouches packaged using the method of the present invention using the mean volume of a conventionally packaged pouch as a reference. As discussed previously, conventionally packaged pouches retain substantially no gas after they are sealed and their volume is therefore substantially equal to the volume of their contents.

The mean volume of pouches (of equal width/height and containing the same weight/type of foodstuff) filled by the packaging method of the present invention is, in the present non-limiting example shown in Fig. 2, at least 11.4% greater than that of conventionally packaged reference pouches.

Depending upon the nature of the foodstuff contained within the partially inflated pouch, the increase in

volume over that of the reference is adapted to be at least 5%.

Such an increase in volume is beneficial in terms of reducing the pressure applied to the foodstuff by the walls of the container. Therefore, the likelihood of agglomeration of, for example, cereal grains during the retort sterilisation process and during storage, distribution and use is substantially reduced. Maintaining separate free flowing cereal grains is a critical quality parameter making the product more appealing to the consumer and is absent in foodstuffs made using conventional processes.

Modifications and improvements may be made without departing from the scope of the present invention. For example, the flexible walled container may be made from a non-microwavable foil-based material or from a material suitable for boil-in-bag cooking.

Although the inert gas is described above as being nitrogen, other inert gases such as carbon dioxide, helium, argon, neon and xenon could be used. Similarly, although the foodstuff has been described in the foregoing description as rice, the method is equally suitable for packaging other cereal based foodstuffs. For example, couscous, wild rice, barley, wheat, oats, rye, millet, maize etc.

Moreover, the method of filling the pouches may be performed either manually or by automated means.